REMARKS

Applicant's representative thanks the Examiner and Primary Examiner for the courtesies extended during the telephonic conference on January 9, 2008, with Francis Dunn. During the conference, there was discussion regarding overcoming the rejections of the subject claims, including discussion regarding a proposed amendment to independent claim 27 to further emphasize distinctive aspects of the claimed subject matter. There was also discussion regarding claims 1 and 33. There was further discussion regarding Zhao (US Patent No. 6,487,301), Lienhart, *et al.* (US 6,470,094), and Hale, *et al.* (US 6,928,548), including discussion regarding "hash function" as referenced in Zhao and a "Bound and Relocated Import Table (BRIT)" as referenced in Hale, *et al.*

Claims 1-42 are currently pending in the subject application and are presently under consideration. Claims 1, 25, 33, 38-40, and 42 have been amended as shown on pages 2-16 of the Reply. No new matter has been added.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

I. Rejection of Claims 1-4, 7-9, 11-12, 19-22, 25-26, 33-36, 38-40, and 42 Under 35 U.S.C. § 103(a)

Claims 1-4, 7-9, 11-12, 19-22, 25-26, 33-36, 38-40, and 42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhao (US Patent No. 6,487,301), in view of Lienhart, *et al.* (US 6,470,094), and further in view of Hale, *et al.* (US 6,928,548). It is requested that this rejection be withdrawn for at least the following reasons. Zhao, Lienhart, *et al.*, and Hale, *et al.*, either alone or in combination, do not disclose, teach, or suggest each and every element of the subject claims. To reject a claim under 35 U.S.C. § 103(a),

> the prior art reference (or references when combined) ***must teach or suggest all the claim limitations.*** *See* MPEP § 706.02(j) (emphasis added). The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *See In re Vaeck,*

947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The claimed subject matter relates to indexing and/or retrieval of a stored electronic document by comparing a signature related to the document with a signature related to an image of a printed document corresponding to the stored document. The claimed subject matter can utilize word-level topological properties (*e.g.*, location of a word, width of a word, *etc.*) of the document to generate a signature for that document, thereby enabling retrieval of the stored document (*e.g.*, stored image) more efficiently and expeditiously. Signatures that identify stored documents can be generated by obtaining data associated with the respective word-layouts within the documents. For example, a location of a word or a portion of words, or a width of words, within a document can be utilized to create a signature that robustly identifies a document, as a probability of two disparate documents having a substantially similar layout pattern is low. As further example, signatures can be represented by hash tables where each table location can correspond to a respective portion of a document. A data value can be entered into the table location based on the information (*e.g.*, word, blank space, *etc.*) at that corresponding portion of the document.

Signatures that represent word-layouts of electronic documents (*e.g.*, stored images) can then be compared with a signature of a later-captured image of a printed document, and the stored electronic document(s) whose signature(s) most closely matches the signature of the later-captured image can be retrieved, for example. For instance, where the signatures are represented as hash tables, a particular electronic document(s) can be retrieved if that electronic document(s) has the highest number of table locations that have values that match corresponding table locations of the captured document, as compared to other electronic documents.

In accordance with another aspect of the claimed subject matter, a multi-tiered comparison of the signature of the captured image and the signature(s) of the stored image(s) can be performed. For instance, a portion of the signature of a captured image can be compared to respective portions of signatures of stored images, and those stored images whose signature portion fails to match that of the captured image can be excluded from further consideration. Subsequent iteration(s) can be performed to compare a

smaller portion of the signature of the captured image and a smaller portion of the signature(s) of the remaining stored image(s), with the size of the signature portion becoming smaller with each iteration, until the number of stored image(s) reaches a predetermined threshold number. After the predetermined threshold number of remaining stored images has been reached, the remaining stored image(s) can be returned to the user and/or can each be further compared to determine which stored image most closely matches the captured image. Thus, indexing and/or retrieval of documents can be facilitated without requiring an exorbitant amount of resources or time.

In particular, independent claim 1 (and similarly independent claims 38 and 40), as amended, recites: ***a comparison component that iteratively compares a portion of a signature associated with the captured image with corresponding portions of signatures respectively associated with the generated images and excludes each generated image whose portion of the signature does not match the portion of the signature of the captured image to facilitate location of a match to the physical document, the portion of the signature associated with the captured image and the portion of the signatures respectively associated with the generated images that are compared become progressively smaller with each iteration, where one or more iterations are performed until a predetermined threshold number of generated images remain***. Zhao, Lienhart, *et al*., and Hale, *et al*., either alone or in combination, do not teach or suggest this distinctive feature of the claimed subject matter.

Rather, Zhao discloses techniques for incorporating authentication information into digital representations of objects using the authentication information to authenticate the objects. (*See* Abstract). Zhao further discloses selecting semantic information from a digital representation and using it to make a digest. (*See* col. 6, lns. 32-36). Semantic information in a digital representation of an image of a document is the representations of the alphanumeric characters in the document, where alphanumeric characters are understood to include representations of any kind of written characters or punctuation marks. (*See* col. 6, lns. 52-57). Zhao discloses determining the authenticity of a digital representation of an object by comparing its authentication information to the authentication information that can be stored in a storage system or can be semantic information in the digital representation which can be read. (*See* col. 4, lns. 15-33).

However, unlike the claimed subject matter, Zhao fails to disclose retrieving a document from a database by performing an iterative multi-tier comparison of a portion of a signature of a captured image to respective portions of signatures of generated images to exclude those generated images whose signature portion fails to match that of the signature portion of the captured image in order to facilitate retrieving the desired generated image that matches the captured image. The Examiner correctly states that Zhao fails to teach the distinctive comparison functionality of the claimed subject matter. (*See* Office Action dated October 11, 2007, p. 5, lns. 3-7).

Further, Lienhart, *et al.* fails to teach or suggest the distinctive features of the claimed subject matter. Rather, Lienhart, *et al.* relates to localization and/or segmentation of text in images, wherein the images may be still or motion images, such as in video or web pages. (*See* col. 1, lns. 64-67). The Examiner correctly states that Lienhart, *et al.* does not teach the distinctive comparison functionality of the claimed subject matter. (*See* Office Action dated October 11, 2007, p. 5, lns. 3-7).

Hale, *et al.* also fails to teach the distinctive functionality of the claimed subject matter. Hale, *et al.* relates to verifying the integrity of information that is stored in an electronic device during preboot operations. (*See* col. 2, lns. 63-65). The stored information may include a digitally signed image that includes a post-relocation image of a software module or is dynamically linked with another digitally stored image. (*See* col. 2, ln. 66 – col. 3, ln. 2). A pre-location image is a binary representation of a software module prior to conducting a relocation operation thereon. (*See* col. 3, lns. 12-14). A post re-location image is a binary representation of a software module after relocation. (*See* col. 3, lns. 14-15). The post re-location image differs from the pre-location image. (*See* col. 3, lns. 41-42). A digital signature is based on a hash value of its pre-location image. (*See* col. 5, lns. 21-24). Upon being loaded with the digitally signed images, the memory undergoes a relocation operation which modifies the stored images from the pre-relocation images to post-relocation images. (*See* col. 5, lns. 24-29). For integrity verification of stored information, a post-relocation image of a digitally signed image is reconverted to a pre-relocation image. (*See* col. 5, lns. 30-35). A hash operation is performed on the reconverted, pre-relocation image to produce a hash value ("reconverted hash value"). (*See* col. 5, lns. 41-43). The recovered hash value of a digital

signature is compared to the reconverted hash value to determine if there is a match in order to verify the post-relocation image. (*See* col. 5, lns. 44-52).

However, unlike the claimed subject matter, Hale, *et al.* fails to teach iteratively comparing a portion of a signature of a captured image with corresponding portions of generated images to locate a physical document associated with the captured image. Rather, Hale, *et al.* teaches comparing a recovered hash value related to a pre-relocation image with a reconverted hash value related to a post-relocation image to determine whether they match. (*See* col. 5, lns. 44-52). A post-relocation image is either verified or not verified. (*See* col. 5, lns. 50-55). Hale, *et al.* does not perform multiple iterations with respect to a group of images in order to locate a desired image or document.

Hale, *et al.* also teaches employing tables where each digitally signed image can be associated with a respective import table, export table, and image. (*See* col. 6, ln. 50-col. 7, ln. 11). Hale, *et al.* teaches that, to verify the integrity of the digitally signed images, a hash operation can be performed on an import table, export table, and image associated with a digitally signed image, which can produce a resultant hash value. (*See* col. 7, lns. 7-14). The resultant hash value can be compared to the recovered hash value of the digital signature associated with such digitally signed image, and if the resultant hash value matches the recovered hash value, the import table, export table, and image associated with the digitally signed image have not been modified. (*See* col. 7, lns. 14-19). This operation is continued with all remaining digitally signed images. (*See* col. 7, lns. 19-21). If the integrity of the digitally signed images cannot be verified, an error is reported. (*See* col. 7, lns. 22-23). Thus, either a match is located or an error is indicated. Therefore, again, Hale, *et al.* fails to teach an iterative comparison of a captured image with a group respective generated images, where the respective signature portions of respective images become smaller (*e.g.,* and more refined) for each iteration, to identify a match or to narrow the number of potential choices of generated images to a predetermined threshold number.

In contrast, to facilitate locating a desired physical document, the claimed subject matter can search word-level topological properties, such as the respective widths of words associated with generated images, to match a generated image(s) with the captured image associated with the physical document. The claimed subject matter can retrieve

generated image(s) that match the captured image, or a portion thereof, from a data store. To facilitate retrieving the desired generated image, the claimed subject matter can perform a multi-tiered comparison to iteratively compare a portion of a signature associated with the captured image with corresponding portions of signatures respectively associated with generated images that can be stored in a data store. Those signature portions of the generated images that do not match the corresponding portion of the captured image can be excluded from further consideration.

In one aspect, the claimed subject matter can perform another tier of comparisons, as the comparison component can compare a smaller signature portion of the captured image to corresponding smaller respective signature portions of the generated images that remain in consideration, excluding those generated images whose smaller signature portion fails to match the smaller signature portion of the captured image. The comparison component can continue to perform iterative comparisons involving respective signature portions of images (*e.g.,* generated image, captured image) that can be progressively smaller in size with each iteration until a predetermined threshold number of generated images remain for consideration. Once the predetermined threshold number of generated images has been reached, the remaining generated image(s) can be returned to the user and/or can each be further compared to determine which generated image most closely matches the captured image. Thus, indexing and/or retrieval of documents can be facilitated without requiring an exorbitant amount of resources or time.

In addition, independent claim 25 (and similarly independent claim 42), as amended, recites: ***comparing a portion of the signatures corresponding to respective generated images to a portion of the signature corresponding to the captured image; and identifying at least one generated image that has a highest number of table locations that have respective values that match values in corresponding table locations associated with the captured image***. Zhao, Lienhart, *et al.*, and Hale, *et al.*, either alone or in combination, do not teach or suggest this distinctive aspect of the claimed subject matter.

For at least reasons similar to the reasons stated *supra*, Zhao and Lienhart, *et al.* fail to teach comparing signatures of generated images to the signature of a captured image, as in the claimed subject matter. Further, Zhao, Lienhart, *et al.*, and Hale, *et al.*

are all silent regarding identifying a generated image by finding the generated image with the highest number of table locations that have respective values that match corresponding table locations associated with a captured image. Hale, *et al*. does teach performing a hash operation on an import table, export table, and image of the first digitally signed image to produce a resultant hash value that is compared with a hash value uncovered from the digital signature associated with the first digitally signed image. (*See* col. 7, lns. 11-17). If there is a match, the import table, export, table, and image have not been modified. (*See* col. 7, lns. 17-19). If the integrity of the digitally signed images cannot be verified, such as when there is no match, an error is reported. (*See* col. 7, lns. 22-23). Thus, Hale, *et al*. teaches that either the compared hash values match or they do not match.

In contrast, the claimed subject matter can facilitate identifying and/or retrieving a desired physical document(s) by comparing respective signatures, or a portion thereof, respectively associated with generated images to a signature, or a portion thereof, associated with the captured image. In one aspect, the respective signatures can be represented by respective hash tables that can contain a plurality of table locations. The corresponding table locations of respective hash tables, or respective portions of such hash tables, of the generated images can be compared to corresponding table locations of a hash table, or respective portions of that hash table, associated with the captured image to facilitate determining if one or more generated images match the captured image. The claimed subject matter can identify one or more generated images as the desired image(s) based in part on the generated image(s) having the highest number of table locations that have respective values that match the respective values of corresponding table locations associated with the captured image. By employing hash tables, locating desired generated images associated with physical documents can be facilitated as, typically, less time and resources are utilized to locate the desired images as compared to other techniques for locating documents (*e.g.,* optical character recognition (OCR)).

Furthermore, independent claim 33, as amended, recites: ***means for iteratively comparing location of respective words and width of respective words within a portion of a signature associated with the captured image to the location of respective words and width of respective words within respective portions of signatures associated with***

the generated images and excluding each generated image whose signature portion does not match the signature portion of the captured image, the portion of the signature associated with the captured image and the corresponding portions of the signatures respectively associated with the generated images that are compared become progressively smaller with each iteration, where one or more iterations are performed until a predetermined threshold number of generated images remain. For at least reasons similar to the reasons stated *supra*, for example, with regard to independent claim 1, Zhao, Lienhart, *et al*., and Hale, *et al*., either alone or in combination, do not teach or suggest such distinctive functionality of the claimed subject matter.

Also, independent claim 39 recites: ***an iterative comparison of a portion of a signature associated with the at least one captured image with corresponding portions of signatures respectively associated with the at least one stored image and excludes each stored image whose signature does not match the signature of the at least one captured image to facilitate identification of a match to the electronic document, the portion of the signature associated with the at least one captured image and the portion of the signatures respectively associated with the at least one stored image that are compared become progressively smaller with each iteration, where one or more iterations are performed until a predetermined threshold number of signatures associated with the at least one stored image remains, wherein the topological word properties comprise at least width of respective words***. For at least reasons similar to the reasons stated *supra*, for example, with regard to independent claim 1, Zhao, Lienhart, *et al*., and Hale, *et al*., either alone or in combination, do not teach or suggest such distinctive functionality of the claimed subject matter.

In view of at least the foregoing, it is readily apparent that Zhao, Lienhart, *et al*., and Hale, *et al*., either alone or in combination, fail to disclose, teach, or suggest each and every element of the claimed subject matter as recited in independent claims 1, 25, 33, 38-40, and 42 (and associated claims 2-4, 7-9, 11, 12, 19-22, 26, 34-36). Accordingly, it is believed that the subject claims are in condition for allowance, and the rejection should be withdrawn.

II. Rejection of Claims 5-6, 10, and 24 Under 35 U.S.C. § 103(a)

Claims 5-6, 10, and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhao, in view of Lienhart, *et al.*, and further in view of Hale, *et al.*, and further in view of Ming Ye, *et al.*, "Document Image Matching and Annotation Lifting," 2001 IEEE (hereinafter "Ye, *et al.*"). This rejection should be withdrawn for at least the following reason. Zhao, Lienhart, *et al.*, Hale, *et al.*, and Ye, *et al.*, either alone or in combination, do not disclose, teach, or suggest each and every element of the subject claims. Claims 5, 6, and 10 depend from independent claim 1. Ye, *et al.* fails to cure the aforementioned deficiencies of Zhao and Lienhart, *et al.*, and Hale, *et al.*, as to independent claim 1.

Further, independent claim 24 recites: ***comparing the one or more signatures corresponding to the one or more generated images to the signature corresponding to the captured image; and***

identifying a generated image that has a highest number of table locations that have respective values that match values in corresponding table locations associated with the captured image. Zhao, Lienhart, *et al.*, and Hale, *et al.*, either alone or in combination, do not teach or suggest this distinctive functionality.

For at least reasons similar to the reasons stated *supra*, such as for example, with regard to independent claims 1 and 25, Zhao and Lienhart, *et al.* fail to teach comparing signatures of generated images to the signature of a captured image, as in the claimed subject matter. Further, Zhao, Lienhart, *et al.*, and Hale, *et al.* are all silent regarding identifying a generated image by finding the generated image with the highest number of table locations that have respective values that match corresponding table locations associated with a captured image. Hale, *et al.* does teach performing a hash operation on an import table, export table, and image of the first digitally signed image to produce a resultant hash value that is compared with a hash value uncovered from the digital signature associated with the first digitally signed image. (*See* col. 7, lns. 11-17). If there is a match, the import table, export, table, and image have not been modified. (*See* col. 7, lns. 17-19). If the integrity of the digitally signed images cannot be verified, sich as when there is no match, an error is reported. (*See* col. 7, lns. 22-23). Thus, Hale, *et al.* discloses that either the compared hash values match or they do not match.

In contrast, the claimed subject matter can facilitate locating and/or retrieving a desired physical document by comparing respective signatures, or a portion thereof, respectively associated with generated images to a signature, or a portion thereof, associated with the captured image. The respective signatures can be represented by respective hash tables that can contain a number of table locations. The corresponding table locations of respective hash tables, or portions thereof, of the generated images can be compared to corresponding table locations of the hash table associated with the captured image to facilitate determining whether a generated image(s) matches the captured image. The claimed subject matter can identify a generated image as the desired image based in part on the generated image having the highest number of table locations that have respective values that match the respective values of corresponding table locations associated with the captured image.

In view of at least the foregoing, it is readily apparent that Zhao, Lienhart, *et al.*, Hale, *et al.*, and Ye, *et al.*, either alone or in combination, fail to disclose, teach, or suggest each and every element of the claimed subject matter as recited in claims 5, 6, 10, and 24. Accordingly, it is believed that the subject claims are in condition for allowance, and the rejection should be withdrawn.

III. Rejection of Claim 41 Under 35 U.S.C. § 103(a)

Claim 41 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhao, in view of Lienhart, *et al.*, and further in view of Hale, *et al.*, and further in view of Bresler, *et al.* (US Patent App. Pub No. 2003/0152293). This rejection should be withdrawn for at least the following reason. Zhao, Lienhart, *et al.*, Hale, *et al.*, and Bresler, *et al.*, either alone or in combination, do not teach or suggest each and every element of the subject claims. Claim 41 contains elements similar to independent claim 1. Bresler, *et al.* fails to cure the aforementioned deficiencies of Zhao, Lienhart, *et al.*, and Hale, *et al.*, as to independent claim 1, and therefore, with regard to claim 41 as well. Accordingly, this rejection should be withdrawn

IV. Rejection of Claims 13, 23, 27, 29 and 37 Under 35 U.S.C. § 103(a)

Claims 13, 23, 27, 29 and 37 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhao, in view of Lienhart, *et al.*, and further in view of Hale, *et al.*, and further in view of Shin-Ywan Wang, *et al.*, "Block Selection: A Method for Segmenting Page image of Various Editing Styles," Canon Information Systems 1995 IEEE (hereinafter "Wang, *et al.*"). This rejection should be withdrawn for at least the following reason. Zhao, Lienhart, *et al.*, Hale, *et al.*, and Wang, *et al.*, either alone or in combination, do not teach or suggest each and every element of the subject claims. Claims 13 and 23 depend from independent claim 1; claims 27 and 29 depend from independent claim 25; and claim 37 depends from independent claim 33. Wang, *et al.* fails to cure the aforementioned deficiencies of Zhao, Lienhart, *et al.*, and Hale, *et al.*, as to independent claims 1, 25, and 33. Accordingly, this rejection should be withdrawn.

V. Rejection of Claim 28 Under 35 U.S.C. § 103(a)

Claim 28 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhao, in view of Lienhart, *et al.*, and further in view of Hale, *et al.*, and further in view of Wang *et al.*, and further in view of Ye, *et al.* This rejection should be withdrawn for at least the following reason. Zhao, Lienhart, *et al.*, Hale, *et al.*, Wang, *et al.*, and Ye, *et al.*, either alone or in combination, do not teach or suggest each and every element of claim 28. Claim 28 depends from independent claim 25. Wang, *et al.* and Ye, *et al.* fail to cure the aforementioned deficiencies of Zhao and Lienhart, *et al.*, and Hale, *et al.*, as to independent claim 25. Accordingly, this rejection should be withdrawn.

VI. Rejection of Claims 14-18 and 30-32 Under 35 U.S.C. § 103(a)

Claims 14-18 and 30-32 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Zhao, in view of Lienhart, *et al.*, and further in view of Hale, *et al.*, and further in view of Bloomberg (US Patent No. 5,181,255). This rejection should be withdrawn for at least the following reason. Zhao, Lienhart, *et al.*, Hale, *et al.*, and Bloomberg, either alone or in combination, do not teach or suggest each and every element of the subject claims. Claims 14-18 depend from independent claim 1; and claims 30-32 depend from independent claim 25. Bloomberg fails to cure the aforementioned deficiencies of Zhao, Lienhart, *et al.*, and Hale, *et al.* as to independent claims 25. Accordingly, this rejection should be withdrawn

CONCLUSION

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063[MSFTP504US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

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